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Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

A novel single-step, multipoint calibration method for instrumented Lab-on-Chip systems

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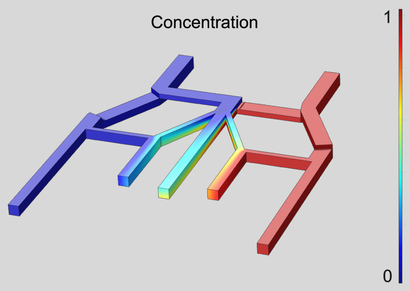
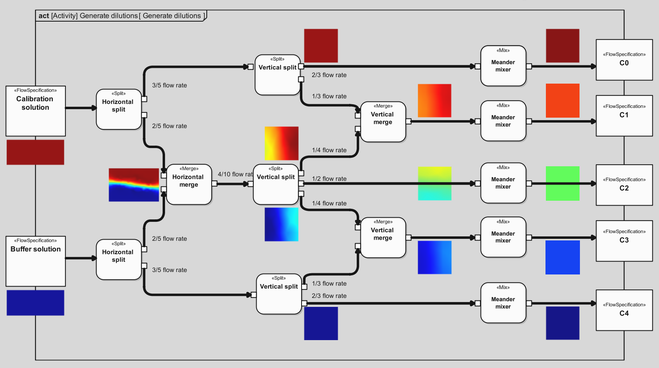
Biosensors for point-of-care technology

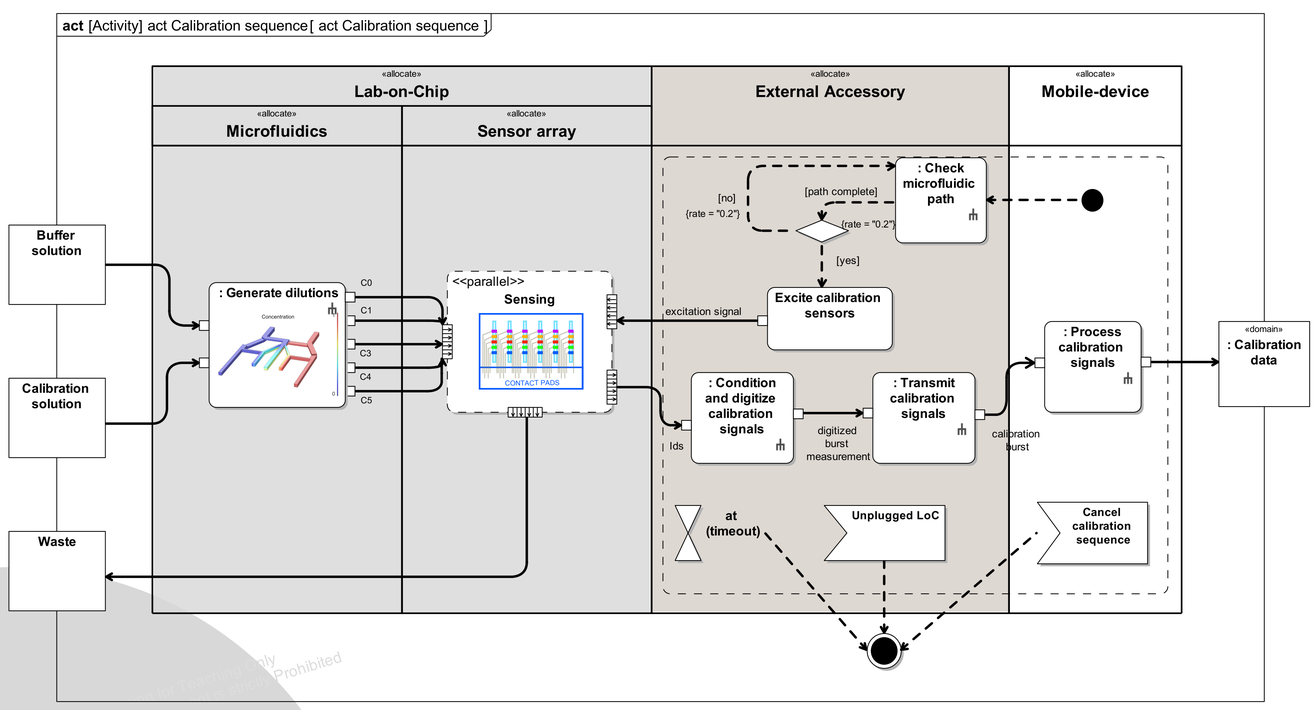
Nanotechnology provides us with highly sensitive sensors for the detection of analytes in sample such as blood plasma. In order to employ these devices as diagnostic tools however, reliability and accuracy of the measurement are extremely important. Single-use sensors lack the possibility to calibrate individual sensors at all and many other sensor systems require constant re-calibration. Thus, a one-step and immediate calibration method is highly desirable for point-of-care systems.

We demonstrate a method for the generation of defined calibration samples from a single input solution that can be used as reference for the calibration of sensor arrays.

Microfluidic dilution system
The input flow streams are layered in defined proportions prior to a final mixing step. By alternating horizontal and vertical orientations of the splitting and merging junctions, lateral diffusion does not impact the final concentration. This removes the need for homogenizing the intermediate dilution steps in a multistep system. In addition, the risk of creating non-uniform distributions in the case of complex samples with differently sized particles (different diffusion

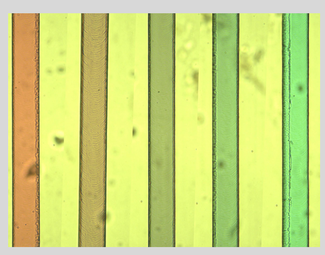






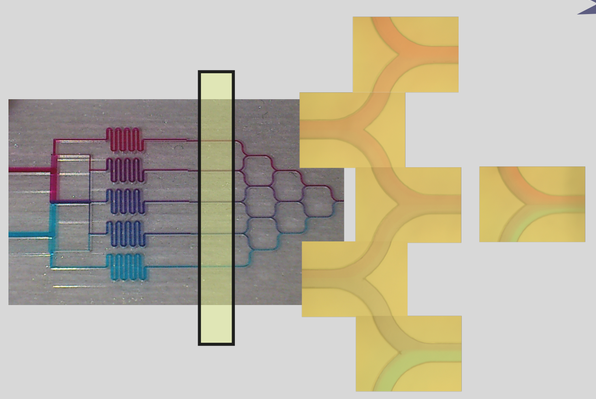
Multipoint calibration

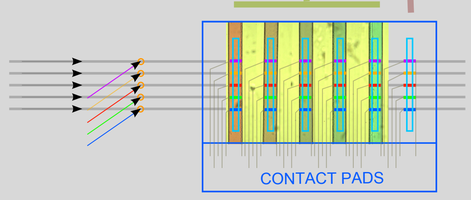
Using a set of discrete concentrations that span the desired analyte concentration range enables real time modeling of the sensor reseponse and makes it possible to obtain quantitative data from a measured sample.
Arrays of single-use sensors that may be sensitive to environmental changes can thus be calibrated at the point of care.



Calibration solutions

Patient sample





Temporary PDMS microfluidic channels

Functionalization

Apply excitation signal and record response